MEMOIR No. 38

NORTH AMERICAN CORDILLERA

FORTY-NINTH PARALLEL

BY

REGINALD ALDWORTH DALY

PART III

GEOLOGICAL SURVEY
DEPARTMENT OF MINES
OTTAWA
1912

KEY SHOWING POSITION OF SHEETS.

Sheet 1—Clarke Range
" 2—Galton Range.
" 3—Rocky Mountain Trench.
" 4—Yahk Range
" 5—Moyie Range.
" 6—Purcell Trench.
" 7—Pend D'Oreille River.
" 8 -Rossland Mountains.
" 9—Christina Lake.
Sheet 10—Midway Mountains,
" 11—Osoyoos Lake.
" 12—Kruger Mountain.
" 13—Okanagan Range.
" 14—Hozomeen Range.
" 15—Skagit Range.
" 16—Chilliwack River.
" 17—Sumas Lake.

Plate 72—Views of the Rocky and Selkirk Ranges.
" 73—Views of the Selkirk, Columbia and Cascade Ranges.
—Erratum Sheet.

SHEET 1.—CLARKE RANGE

ERRATA

Boundary Monument 255 should read 261
" " 256 " " 262
" " 257 " " 263
" " 258 " " 264
" " 259 " " 265
" " 260 " " 266
" " 261 " " 267
" " 262 " " 268
" " 269 is 0.94 miles west of Mon. 270
" " 263 should read 270
" " 264 " " 271
" " 265 " " 272
" " 273 is 1.16 miles east of Mon. 272

LEGEND

MIOCENE PLEISTOCENE & RECENT

- Glacial drift and alluvium — *including winged-out moraines of the Flathead valley*

chiefly MIDDLE CAMBRIAN(?)

- Ks — Kishenehn formation — *chiefly bluish-grey clays; interbeds of grey sandstone & wellite rock*
- Kn — Kintla formation — *chiefly thin-bedded red argillite and interbedded flow of basic lava*
- Sh — Sheppard formation — *chiefly thin-bedded, light grey siliceous dolomite, an interbedded flow of basic lava*
- Pu — Purcell lava — *massive, basic flow*
- Si — Siyeh formation — *chiefly massive, dark grey, siliceous magnesian limestone; also much greenish-grey metargillite*

LOWER CAMBRIAN(?)

- Gr — Grinnell formation — *chiefly thin-bedded red metargillite; an interbedded flow of basic amygdaloid*
- Ap — Appekunny formation — *generally thin-bedded, light greenish-grey metargillite; subordinate quartzite and magnesian limestone lenses*

BELTIAN

- A — Altyn formation — *thin- to thick-bedded, light grey, generally sandy, siliceous, magnesian limestone; bearing fossil, Baltisa depressa*
- Wt — Waterton formation — *massive, dark grey, "Felspathized" dolomite*

CAMBRIAN(?)

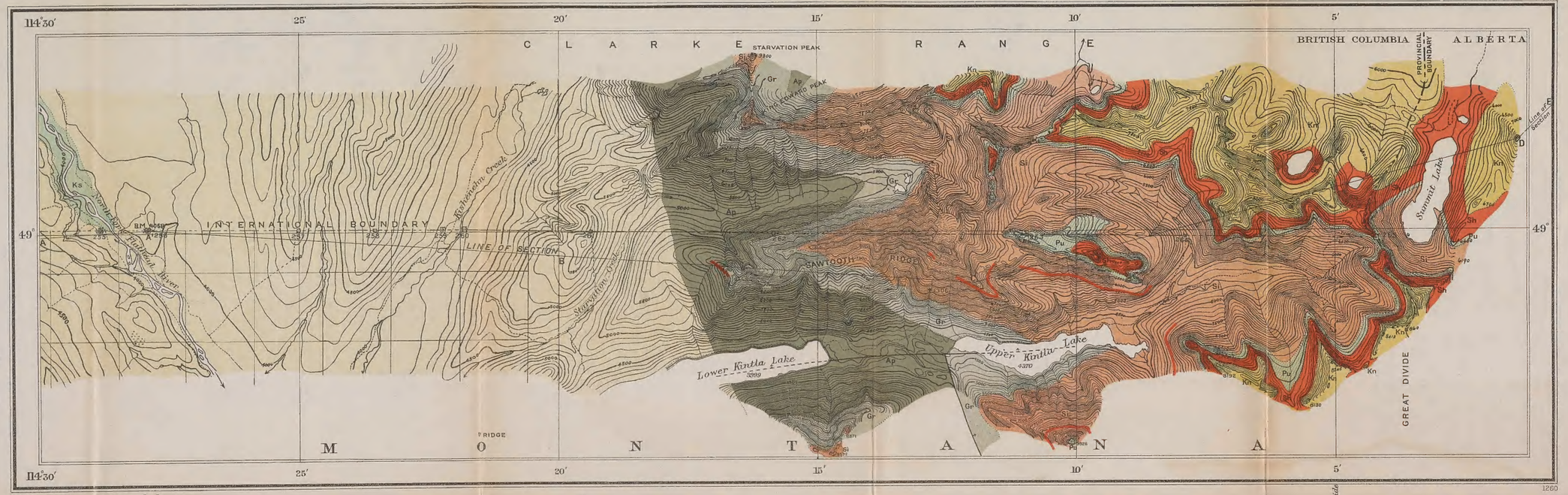
Intrusive

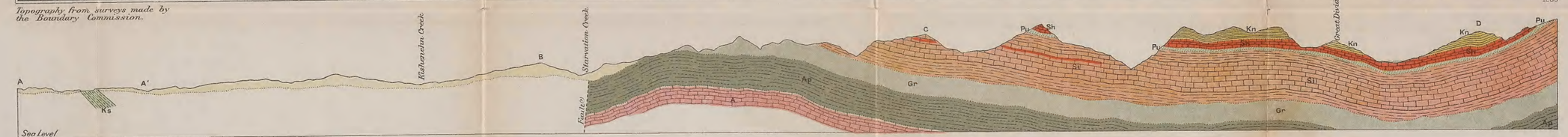
- Abnormal Gabbro

Symbols

- Geological boundary
- Fault

Note. *Localities of chemically analyzed rocks, shown thus,* + 1306





Sections along line AA'BCDEF

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R.A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet.

MAP 74 A

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SHEET 2 – GALTON RANGE

ERRATA

Boundary Monument 245 should read 248
" " 246 " " 249
" " 247 " " 250
" " 248 " " 251
" " 252 is 1.35 miles east of Mon. 251
" " 249 should read 253
" " 250 " " 254
" " 251 " " 255
" " 252 " " 256
" " 257 is 2.59 miles east of Mon. 256
" " 253 should read 258
" " 259 is 2.14 miles east of Mon. 258
" " 254 should read 260

LEGEND

PLEISTOCENE & RECENT

Glacial drift and alluvium

MISSISSIPPIAN & DEVONIAN MIOCENE

Ks — Kishenehn formation
chiefly bluish-grey clay; interbeds of grey sandstone; fossiliferous

Limestone
massive, grey, fossiliferous

R — Roosville formation
light green and grey, thin-bedded metargillite

P — Phillips formation
purplish to red, thin bedded metargillite & quartzite

chiefly MIDDLE CAMBRIAN(?)

G — Gateway formation
chiefly thin-bedded, siliceous metargillite; some dolomite at base.

Pu — Purcell lava
massive; basic flow

Si — Siyeh formation
massive, dark grey, siliceous, magnesian limestone, with thick green-grey metargillite

LOWER CAMBRIAN(?)

W — Wigwam formation
thin- to thick-bedded red sandstone and metargillite

Mc — Macdonald formation
thin to thick-bedded, grey metargillite, with rare lenses of dolomite

H — Hefty formation
chiefly thick-bedded, reddish sandstone

BELTIAN

A — Altyn formation
thin-bedded siliceous dolomite

CAMBRIAN(?)

Intrusive

Abnormal gabbro

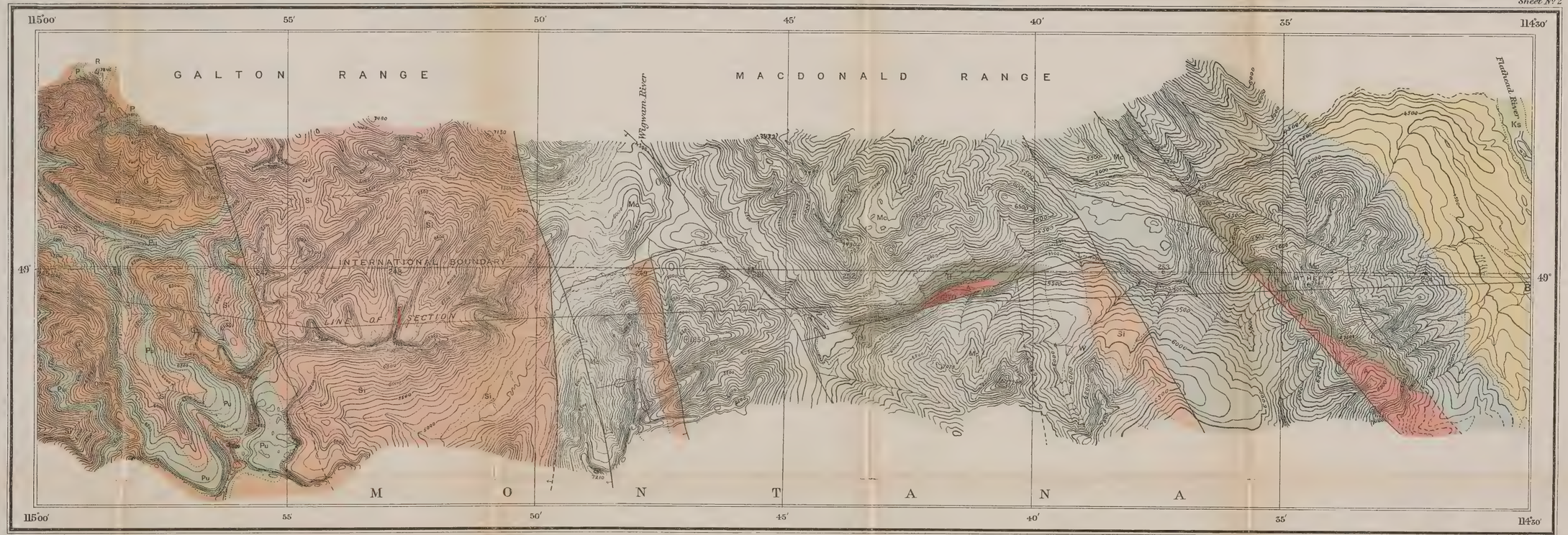
Symbols

Geological boundary

Fault

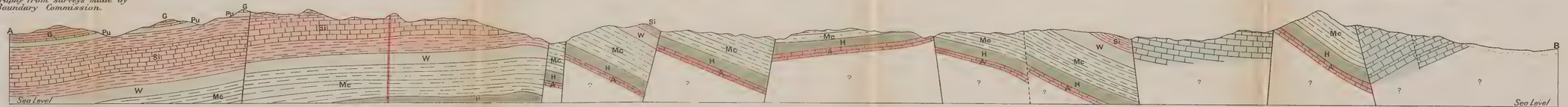
Glacial Striae

Note. *Localities of chemically analyzed rocks, shown thus, +1250*



Topography from surveys made by the Boundary Commission.

1261



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 09864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet.

MAP 75 A

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SHEET 3.—ROCKY MOUNTAIN TRENCH

ERRATA

Boundary Monument 235 should read 237
" " 236 " " 238
" " 237 " " 239
" " 238 " " 240
" " 239 " " 241
" " 240 " " 242
" " 241 " " 243
" " 244 is 0.22 miles west of Mon. 245
" " 242 should read 245
" " 243 " " 246
" " 244 " " 247

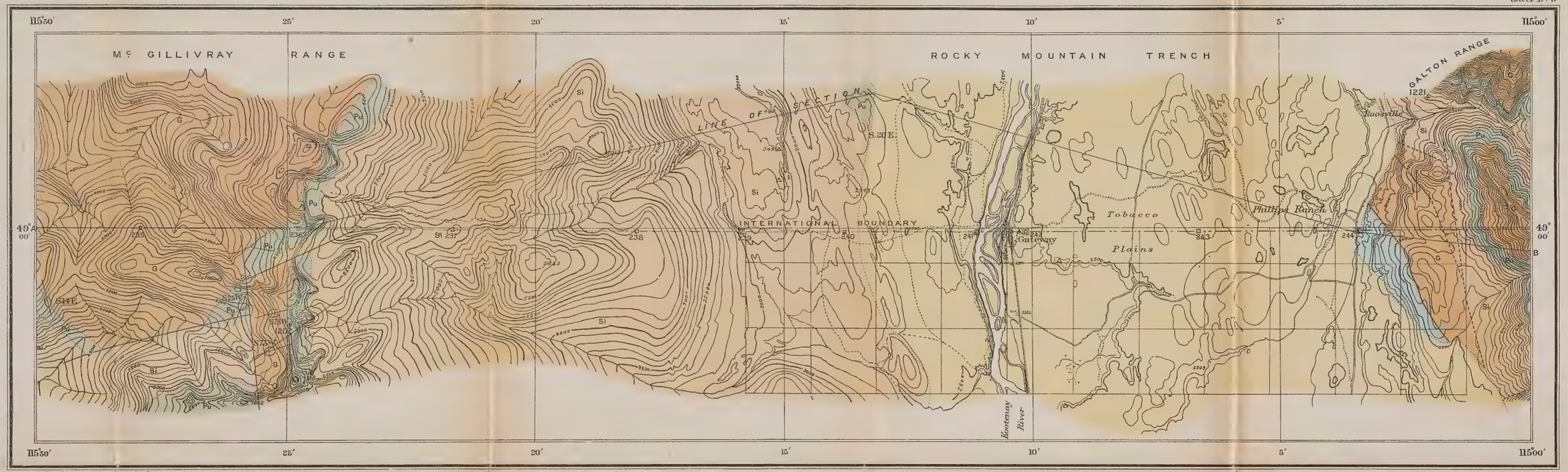
LEGEND

- Glacial drift and alluvium — PLEISTOCENE & RECENT
- Limestone and quartzite — massive; limestone fossiliferous — DEVONIAN
- G — Gateway formation — chiefly thin-bedded, siliceous metargillite, some dolomite at base — Chiefly MIDDLE CAMBRIAN?
- Pu — Purcell lava — massive, basic flows
- Si — Siyeh formation — thin-to-thick-bedded, greenish grey metargillite, with massive, siliceous, magnesian limestone
- W — Wigwam formation — thin-to thick-bedded, red sandstone and metargillite — LOWER CAMBRIAN?
- Mc — MacDonald formation — thin-to-thick-bedded, grey metargillite

Symbols

- Geological boundary
- Fault
- Glacial striæ

Note. *Localities of chemically analyzed rocks, shown thus,* +1202



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 76 A

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SHEET 4.– YAKH RANGE

ERRATA

Boundary Monument 221 should read 223
" " 222 " " 224
" " 223 " " 225
" " 224 " " 226
" " 225 " " 227
" " 226 " " 228
" " 227 " " 229
" " 228 " " 230
" " 229 " " 231
" " 230 " " 232
" " 231 " " 233
" " 232 " " 234
" " 233 " " 235
" " 234 " " 236

LEGEND

Chiefly MIDDLE CAMBRIAN(?)

M — Moyie formation
thin- to thick-bedded shales, metargillites and quartzites; white, grey, blackish, greenish & purplish

G — Gateway formation
chiefly thin-bedded, siliceous metargillites; some dolomite at base. (Equivalent of lower part of Moyie formation.)

Pu — Purcell lava
massive basic flows

Kt — Kitchener formation
thin- to thick-bedded, greenish-grey quartzite and metargillite; somewhat dolomitic in places

Si — Siyeh formation
thin- to thick-bedded, greenish-grey metargillite with massive, siliceous, magnesian limestone. (Equivalent to upper Kitchener formation)

LOWER CAMBRIAN(?) & BELTIAN — (?) LOWER CAMBRIAN(?)

W — Wigwam formation
thin-to-thick-bedded, red sandstone and metargillite (Equivalent of lower part of Kitchener formation)

C — Creston formation
generally thick-bedded, grey quartzite and metargillite; sometimes dolomitic

CAMBRIAN(?)

Intrusive

Abnormal hornblende gabbro

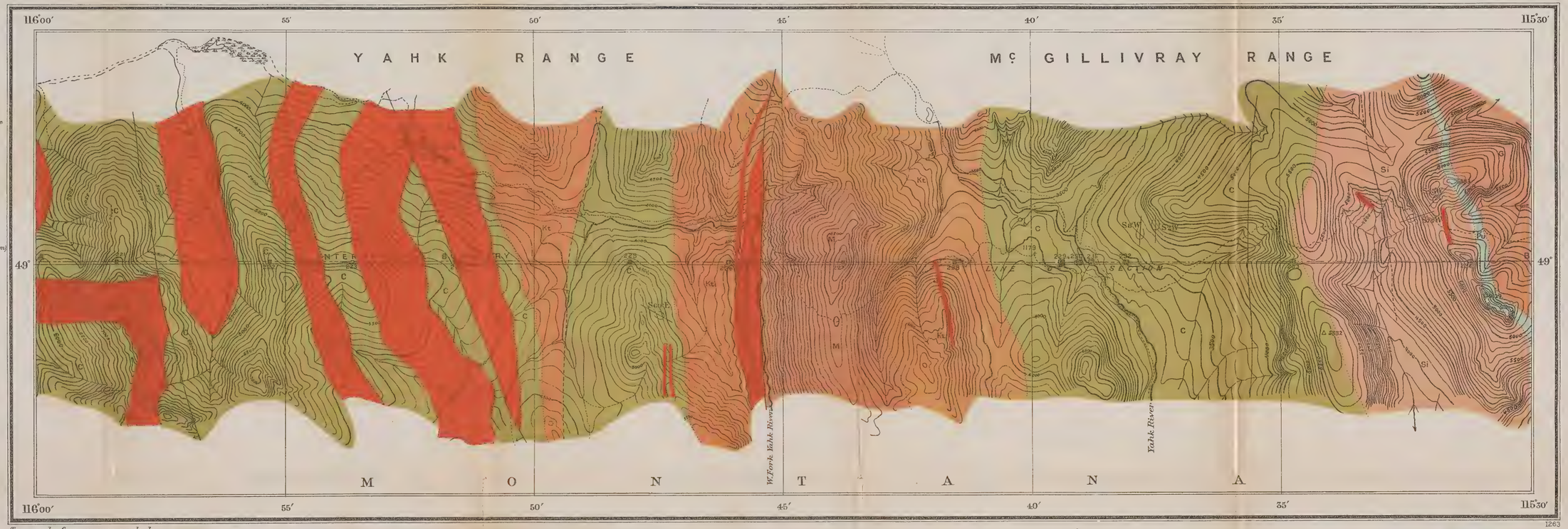
Symbols

Geological boundary

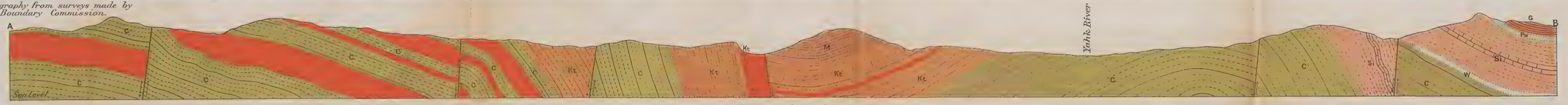
Fault

Glacial striae

Note. Localities of chemically analyzed rocks, shown thus, + 1164



Topography from surveys made by the Boundary Commission.



Section on line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{63360}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 77 A

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SHEET 5.—MOYIE RANGE

ERRATA

Boundary Monument 207 is 2.72 miles west of Mon. 208
" " 207 should read 208
" " 208 " " 209
" " 209 " " 210
" " 210 " " 211
" " 211 " " 212
" " 212 " " 213
" " 213 " " 214
" " 214 " " 215
" " 215 " " 216
" " 216 " " 217
" " 218 is 0.02 miles east of Mon. 217
" " 217 should read 219
" " 218 " " 220
" " 219 " " 221
" " 220 " " 222

LEGEND

chiefly MIDDLE & BELTIAN? (CAMBRIAN) — RECENT

Alluvium

M

Moyie formation
thin-to thick-bedded, shales, metargillite and quartzite; white, grey, blackish, greenish & purplish

Kt

Kitchener formation
thin-to thick-bedded, greenish-grey quartzite and interbedded metargillite

C

Creston formation
massive to thin-bedded, grey quartzite and subordinate metargillite

CAMBRIAN?

Intrusive

Abnormal hornblende gabbro

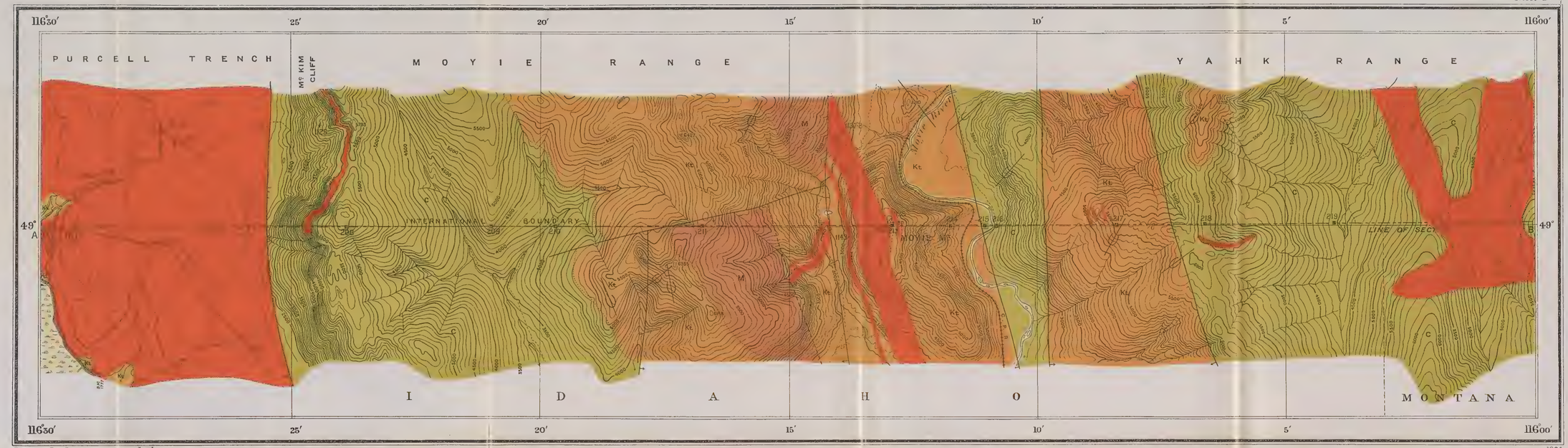
Symbols

Geological boundary

Fault

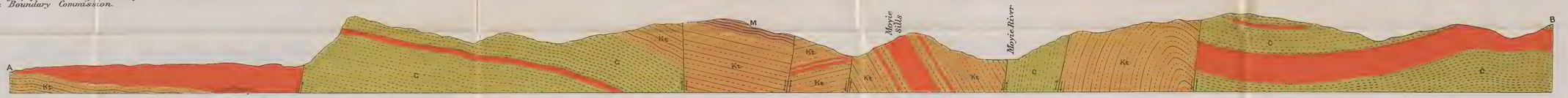
Glacial striae

Note. Localities of chemically analyzed rocks, shown thus, +1434



Topography from surveys made by the Boundary Commission.

1264



Section along line AB

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R.A. Daly.

Scale $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 78A

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SHEET 6.—PURCELL TRENCH

LEGEND

PRE-BELTIAN — LOWER CAMBRIAN (?) Chiefly & BELTIAN — MID CAMBRIAN — RECENT

Alluvium

Kt — **Kitchener formation**
greenish-grey quartzite

Wf — **Wolf formation**
massive grey grit and arkose in very thick beds; subordinate sandstone

Mk — **Monk formation**
alternating phyllites and metamorphosed (schistose) grits, sandstones and conglomerates; grey colours.

Iv — **Irene volcanic formation**
thick flows of pyroxene andesites, with some pyroclastics and a massive interbed of magnesian limestone

Ic — **Irene conglomerate**
massive, greatly sheared; thin sandstone lenses

PRE-BELTIAN PRIEST RIVER TERRANE

A — *mica schists, quartzites and dolomites*

B — *dolomites, quartzite and phyllite*

C — *phyllites and sericite-quartz schist.*

D — *sheared, massive quartzite, with sericite and chloritic schist*

E — *sericite schist, spangled with large biotite crystals*

F — *schistose quartzite and mica schist*

G — *glittering mica schists and sheared quartzite*

Intrusive

CAMBRIAN (?) JURASSIC (?) TERTIARY (?)

Bayonne batholith
basic granodiorite

Rykert batholith
sheared, porphyritic biotite (muscovite) granite

Abnormal hornblende granite
probably a sill

Abnormal hornblende gabbro
sills in Kitchener formation

Greenstone
dikes and sheets in the Priest River terrane

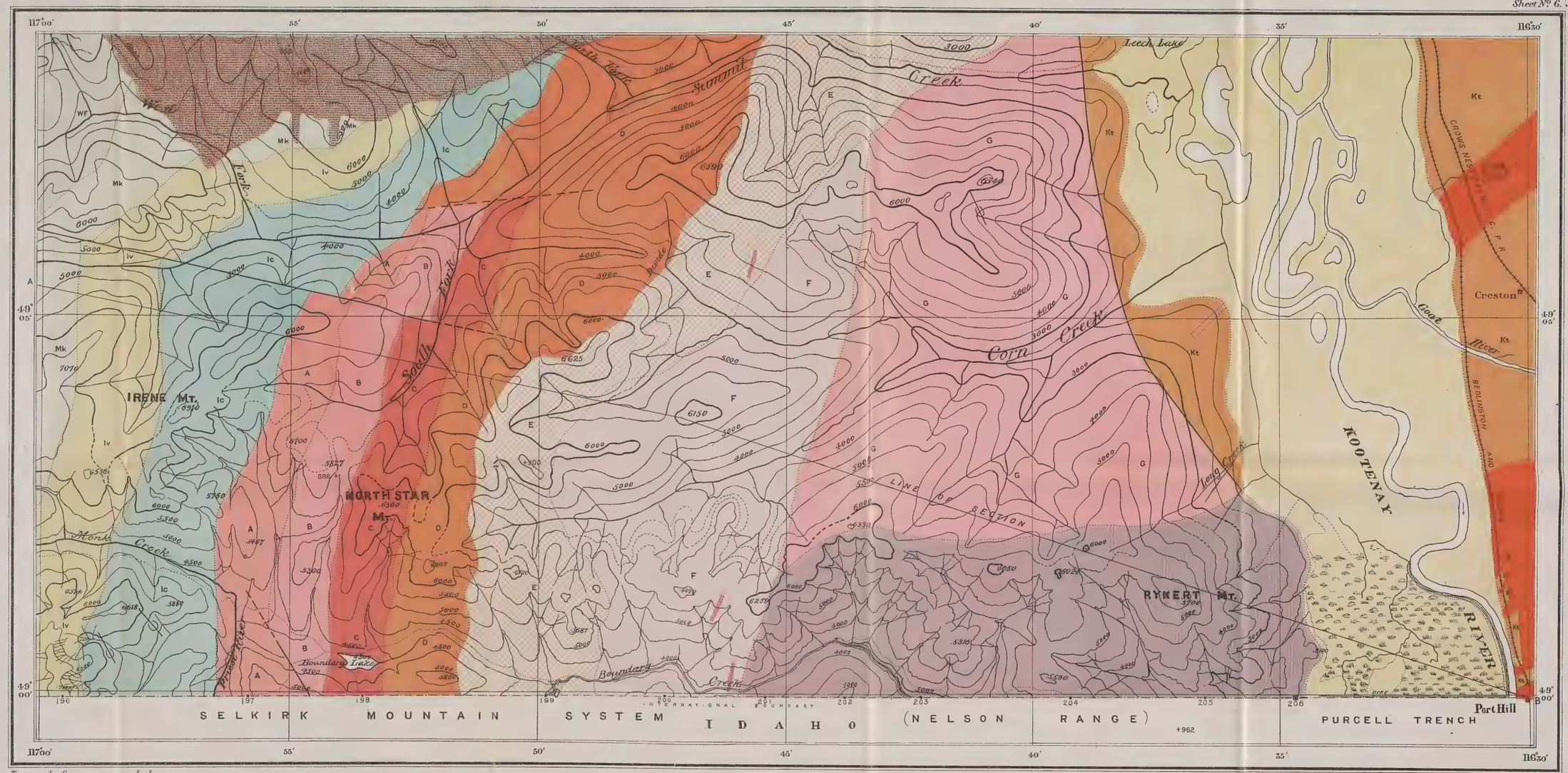
Symbols

Geological boundary

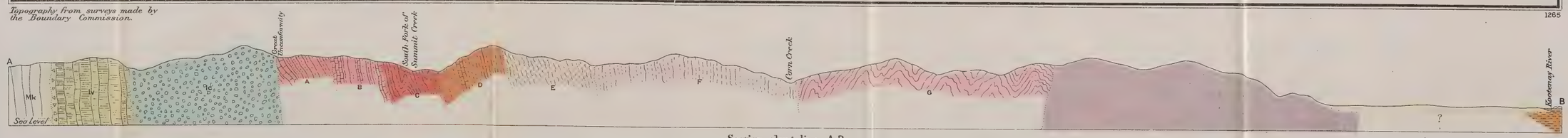
Fault

Glacial striae

Note. *Structure of Pre-Beltian series shown on section, merely diagrammatic. Localities of chemically analyzed rocks, shown thus,* +900



Topography from surveys made by the Boundary Commission.



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 500 feet

MAP 79A

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SHEET 7. PEND D' OREILLE RIVER

LEGEND

TERTIARY

- **Bs** — Beaver Mountain sediments
- **Bv** — Beaver Mountain volcanics
- **Rv** — Rossland volcanic formation
  flows and pyroclastic deposits of augite andesite and basalt

CARBONIFEROUS (?) CRETACEOUS (?)

- Pend D'Oreille limestone
  white to bluish, massive marbles

CARBONIFEROUS (?) ORDOVICIAN CARBONIFEROUS (?)

- **PD** — Pend D'Oreille schist
  carbonaceous phyllite with quartzite and amphibolitic intercalations

MIDDLE CAMBRIAN (?) ORDOVICIAN (?)

- **L** — Lone Star formation
  dark grey, carbonaceous phyllite with quartz schist and quartzite
- **B** — Beehive formation
  banded quartzite, with thin interbeds of micaphyllite

LOWER CAMBRIAN (?) LOWER CAMBRIAN (?)

- **Rp** — Ripple formation
  massive, white quartzite
- **D** — Dewdney formation
  banded quartzite, with conglomerate interbeds

LOWER CAMBRIAN (?) & BELTIAN

- **WF** — Wolf formation
  massive grey grit, and arkose in very thick beds; subordinate sandstone
- **Mk** — Monk formation
  alternating phyllites and metamorphosed (schistose) grits, sandstones, and conglomerates; grey colours.
- **Iv** — Irene volcanic formation
  thick flows of pyroxene andesites, with some pyroclastics

TERTIARY (?)

Intrusive

- Salmon river monzonite
  stock
- Granite
  satellitic to Boyanne batholith
- Olivine syenite
  stock(?)

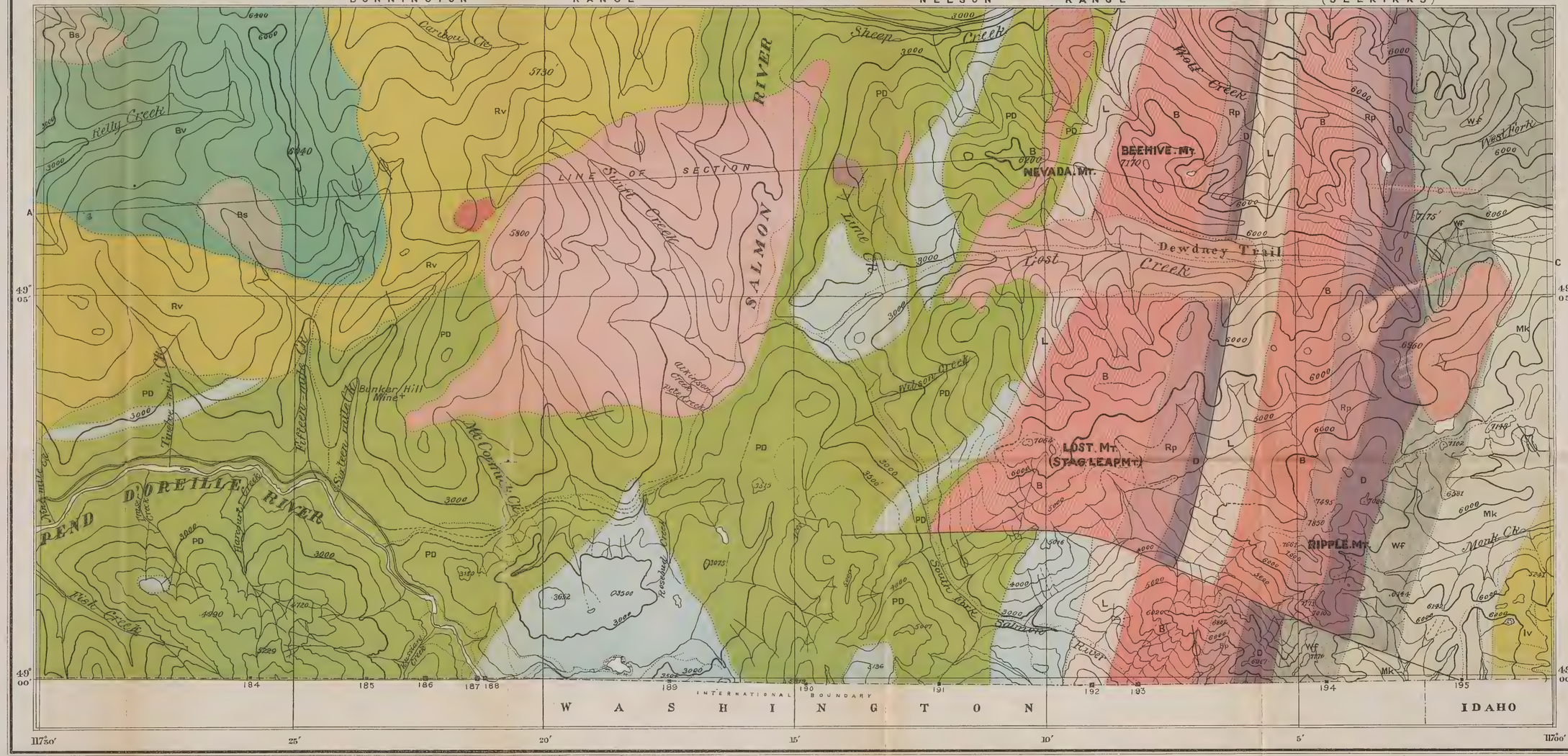
Symbols

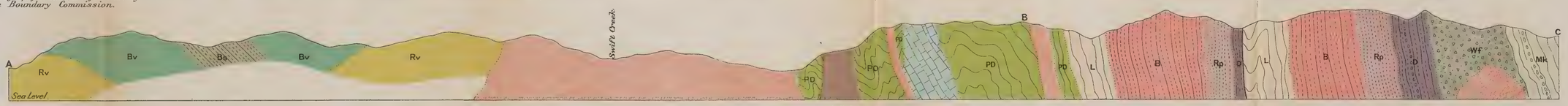
- Geological boundary
- Fault
- Glacial striae

Note: Somewhat numerous, though narrow dikes of minette, cutting the schists in the Pend D'Oreille valley, are not shown.

Note. Localities of chemically analyzed rocks, shown thus, + 666

Topography from surveys made by the Boundary Commission.





Section along line ABC

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R.A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch.

Miles: 1 ½ 0 1 2 3 4

Contour interval, 500 feet

1266

MAP 80A

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SHEET 8. ROSSLAND MOUNTAINS

LEGEND

TERTIARY

- Conglomerate — *fossiliferous on Sophie mountain*
- Bs — Beaver mountain sediments — *grey and brown shales and sandstones*
- Bv — Beaver mountain volcanics — *flows and pyroclastic deposits of augite andesite and basalt*

(?) CARBONIFEROUS TO CRETACEOUS

- Rv — Rossland volcanic formation — *flows and pyroclastic deposits of latites, andesites and basalt*

LOWER CRETACEOUS (CARBONIFEROUS)

- Carbonaceous argillite, sandstone, etc. — *fossiliferous*
- Pend D'Oreille limestone — *white marble, fossiliferous*
- PD — Pend D'Oreille schist — *Carbonaceous phyllite, with quartzite and greenstone intercalations*

(?) CARBONIFEROUS TO ORDOVICIAN

Intrusive

TERTIARY

- Coryell batholith — *hornblende-biotite syenite (pulaskite) with phases of syenite porphyry*
- Sheppard granite — *biotite granite; stocks and dikes*

MESOZOIC

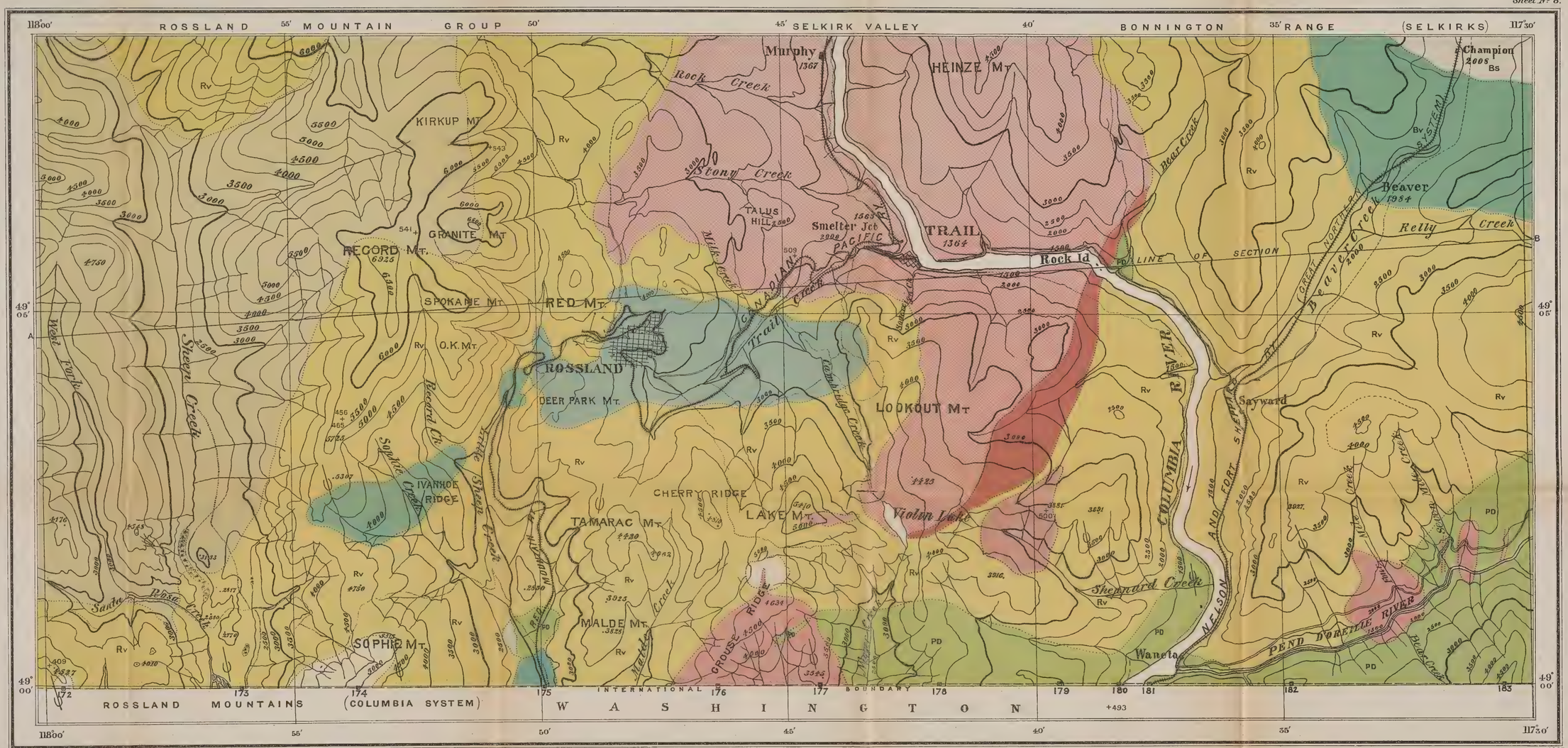
- Shatter-zone of Trail batholith
- Trail batholith — *granodiorite*
- Rossland monzonite — *stock*
- Dunite and Serpentine — *dikes and chemoliths*

Symbols

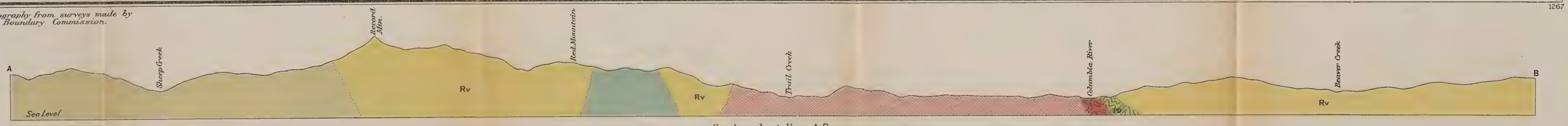
- Geological boundary
- Glacial striae

Note: *Many minettes and other micro-lamprophyres cut the Pend D'Oreille schists in the Pend D'Oreille river gorge, as well as the older rocks in the Rossland mining camp. Numerous porphyrite dikes syngenetic with the Rossland volcanics are not shown and apophysal dikes from batholiths and stocks are likewise not plotted.*

Localities of chemically analyzed rocks, shown thus, +409



Topography from surveys made by the Boundary Commission.



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to Inch.

1 ½ 0 1 2 3 4

Contour interval, 500 feet

MAP 81A

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SHEET 9. CHRISTINA LAKE

ERRATA

Boundary Monument 156 should read 155
" " 157 " " 156
" " 158 " " 157
" " 159 " " 158
" " 160 " " 159
" " 161 " " 160
" " 162 " " 161
" " 163 " " 162
" " 164 " " 163
" " 165 " " 164
" " 165 is a few yards east of the railway track near Laurier.

LEGEND

TERTIARY

- Conglomerate

CARBONIFEROUS TO CRETACEOUS(?)

- Px — Phoenix volcanic formation. *Flows and pyroclastic deposits of augite andesites, etc.*
- Rv — Rossland volcanic formation. *Flows and pyroclastic deposits of latites, andesites and basalt.*

CARBONIFEROUS PALAEOZOIC(?)

- Su — Sutherland schists. *phyllite, garnetiferous, epidiotic and actinolitic schists, etc.*
- Limestone. *white to bluish marble*
- GF — Grand Forks schists. *amphibolite, hornblende schists, etc.*

Intrusive

MIOCENE(?)

- Coryell batholith. *hornblende-biotite syenite (pulaskite)*
- Syenite porphyry. *peripheral (younger) phase of Coryell batholith*

EOCENE(?)

- Olivine syenite
- Harzburgite

CRETACEOUS(?)

- Bitter Creek peridotite
- Fife gabbro
- Baker gabbro
- Dunite

JURASSIC(?)

- Smelter stock. *aplitic granite*
- Cascade batholith. *gneissic biotite granite; satellitic(?) stock south of Castle mountain.*

Symbols

- Geological boundary
- Glacial striae

Note. *Folded structure of Sutherland and Grand Forks schists, in section, merely diagrammatic. Many apophysal dikes from large intrusive masses not shown.*

Localities of chemically analyzed rocks, shown thus, + 517

118°30′ 25′ 20′ 15′ ROSSLAND MOUNTAINS (COLUMBIA SYSTEM) 10′ 5′ 118°00′

49° 05′

49° 00′

CHRISTINA RANGE (COLUMBIA SYSTEM)

ROSSLAND MOUNTAIN GROUP

Mt St THOMAS

CASTLE Mt

Christina Lake

Smelter Lake

GRANBY Smelter

GRAND FORKS

OBSERVATION Mt

Gilpin

CASCADE

Carson

Danville

LINE OF SECTION

INTERNATIONAL BOUNDARY

WASHINGTON

Texas Creek

McRae Creek

Baker Creek

Sutherland Creek

Sheep Creek West Fork

Morris Creek

Golden Creek

Moody Creek

Chandler Ck

Bitter Creek

Deadwood Creek

Santa Rosa Ck

Morans Creek

Dewdney Trail

G.N.R.

C.P.R.

KETTLE RIVER RY.

GREAT NORTHERN RY.

KETTLE RIVER

ROBSON

Fife

Topography from surveys made by the Boundary Commission.

Section along line AB

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R.A. Daly.

Scale: 1/62500 — 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 500 feet

MAP 82A

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1268

ERRATA

Boundary Monument		144	should be deleted		
"	"	145	should read	"	144
"	"	146	"	"	145
"	"	147	"	"	146
"	"	148	"	"	147
"	"	149	"	"	148
"	"	150	"	"	149
"	"	151	"	"	150
"	"	152	"	"	151
"	"	153	"	"	152
"	"	154	"	"	153
"	"	155	"	"	154

LEGEND

(?) PLEISTOCENE & RECENT
Alluvium and glacial drift.

(?) MIOCENE
Mt. Midway volcanic group
trachyte and analcitic rhomb-porphyry; flows and pyroclastic deposits

OLIGOCENE
Ma. Midway volcanic group
andesites and basalt; flows and pyroclastic deposits

CARBONIFEROUS TO TRIASSIC
KR. Kettle river formation
sandstone, conglomerate, shale, arkose

Px. Phoenix volcanic formation
flows and pyroclastic deposits of augite andesite, etc.

CARBONIFEROUS
At. Attwood series
argillite, quartzite, limestone

An. Anarchist series
quartzite, phyllitic shales, greenstones with some limestone pods.

Limestone
crystalline, bluish-grey to white

Ch. Chlorite and hornblende schist

GF. Grand Forks schist
amphibolite, hornblende schists, etc.

Intrusive

(?) MIOCENE
Pulaskite porphyry
dikes and sills

OLIGOCENE
Rhomb – porphyry

Porphyrite
chonolitha, dikes and sills

(?) JURASSIC
Granodiorite
stocks, dikes, etc.

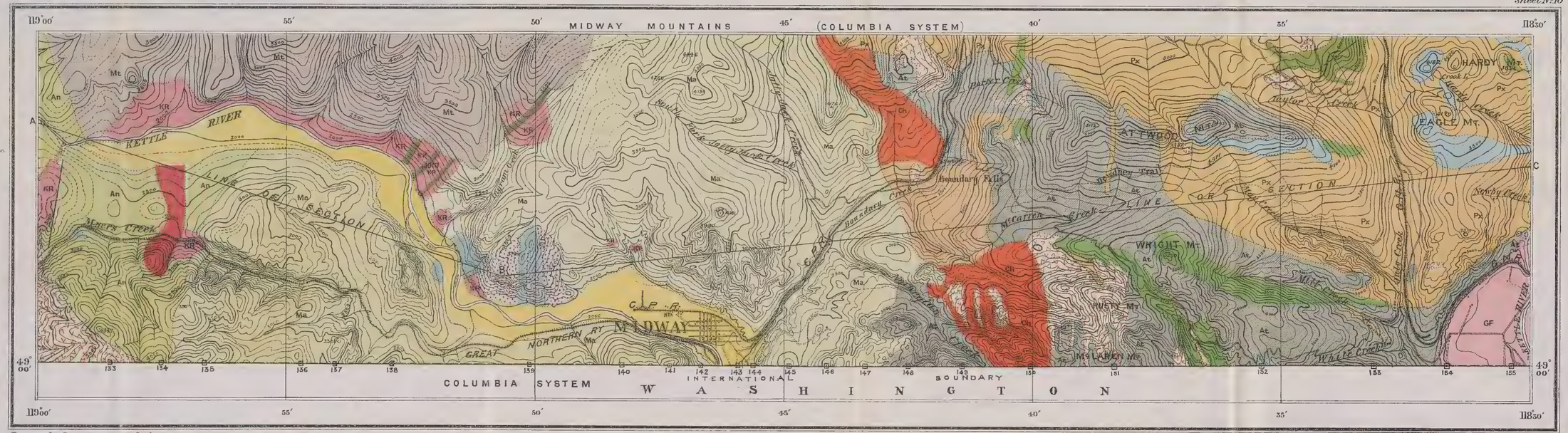
CARBONIFEROUS
Serpentine
dikes, etc.

Symbols

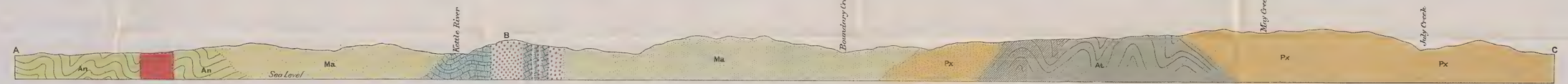
Geological boundary

Glacial striae

Note. Structures shown in schists and limestone merely diagrammatic. On account of the small scale, many dikes and intrusive sheets of porphyrites and porphyries, as well as granodiorite apophyses are not plotted. Similarly many dikes which are cogenetic with the volcanics are not shown.
Localities of chemically analyzed rocks, shown thus, + 1010



Topography from surveys made by the Boundary Commission.



Section along line A B C

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: 1/62500 = 0.9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

SHEET 11. OSOYOOS

LEGEND

(?) PLEISTOCENE & RECENT
- Glacial drift and alluvium

(?) MIOCENE
- Shackanite
  flows (part of Midway volcanic group)
- Extrusive rhomb-porphyry
  flows (part of Midway volcanic group)

OLIGOCENE
- KR
  Kettle river formation
  sandstone, conglomerate, shale, arkose

(?) CARBONIFEROUS
- Limestone of Anarchist series
  white to bluish-grey crystalline

UPPER PALAEOZOIC
- An
  Anarchist series
  quartzite, phyllitic slates, greenstones, with limestone beds.

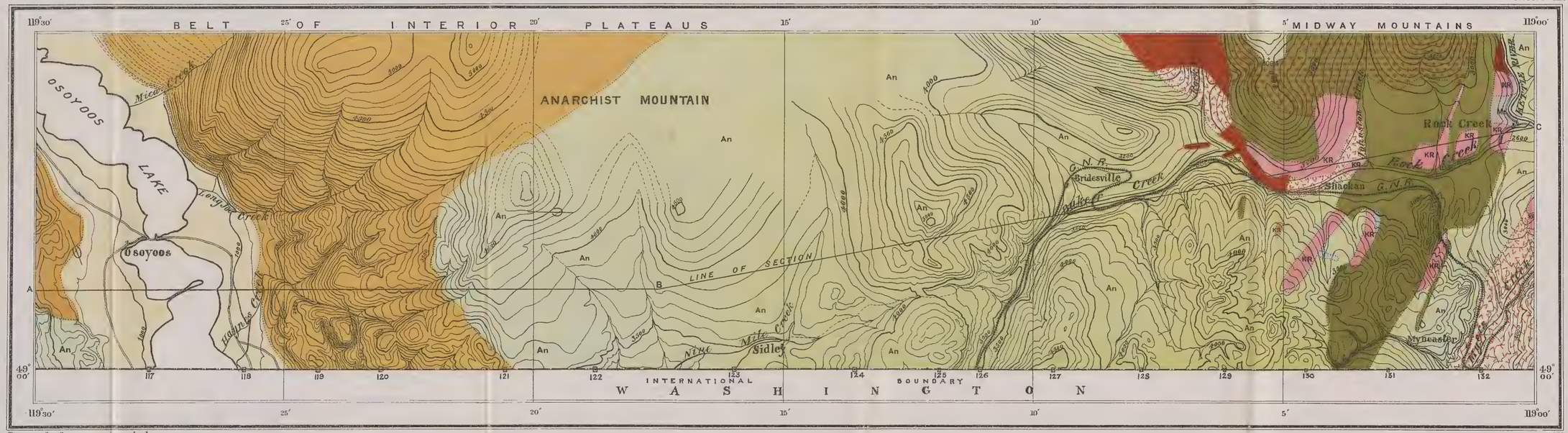
(?) MIOCENE
- Intrusive
- Intrusive rhomb-porphyry
  chonolithe and dikes

(?) JURASSIC
- Granodiorite
- Osoyoos batholith
  gneissic derivative of granodiorite

(?) LATE PALAEOZOIC
- Diorite and gabbro
- Dunite

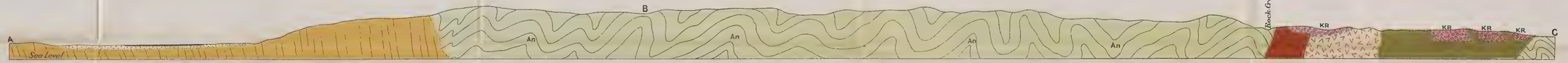
Symbols
- Geological boundary
- Glacial strine

Note: *Structures of Anarchist series, shown in the section, merely diagrammatic.*
Localities of chemically analyzed rocks, shown thus, 4285



Topography from surveys made by the Boundary Commission.

1270



Section along line A B C

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 09864 Statute Miles to 1 Inch

Miles: 1, ½, 0, 1, 2, 3, 4

Contour interval, 100 feet

MAP 84 A

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LEGEND

UPPER PALAEOZOIC(?) / PLEISTOCENE & RECENT

Glacial drift and alluvium

An — Anarchist series: phyllite, slate, quartzite, greenstone, amphibolite, with limestone pods.

Intrusive

TERTIARY

Cathedral batholith — alkaline biotite granite

Similkameen batholith — granodiorite

Kruger alkaline body — malignite and eleolite syenite

JURASSIC(?)

Osoyoos gneissic batholith

LATE PALAEOZOIC(?)

Basic intrusives of Richter mountain

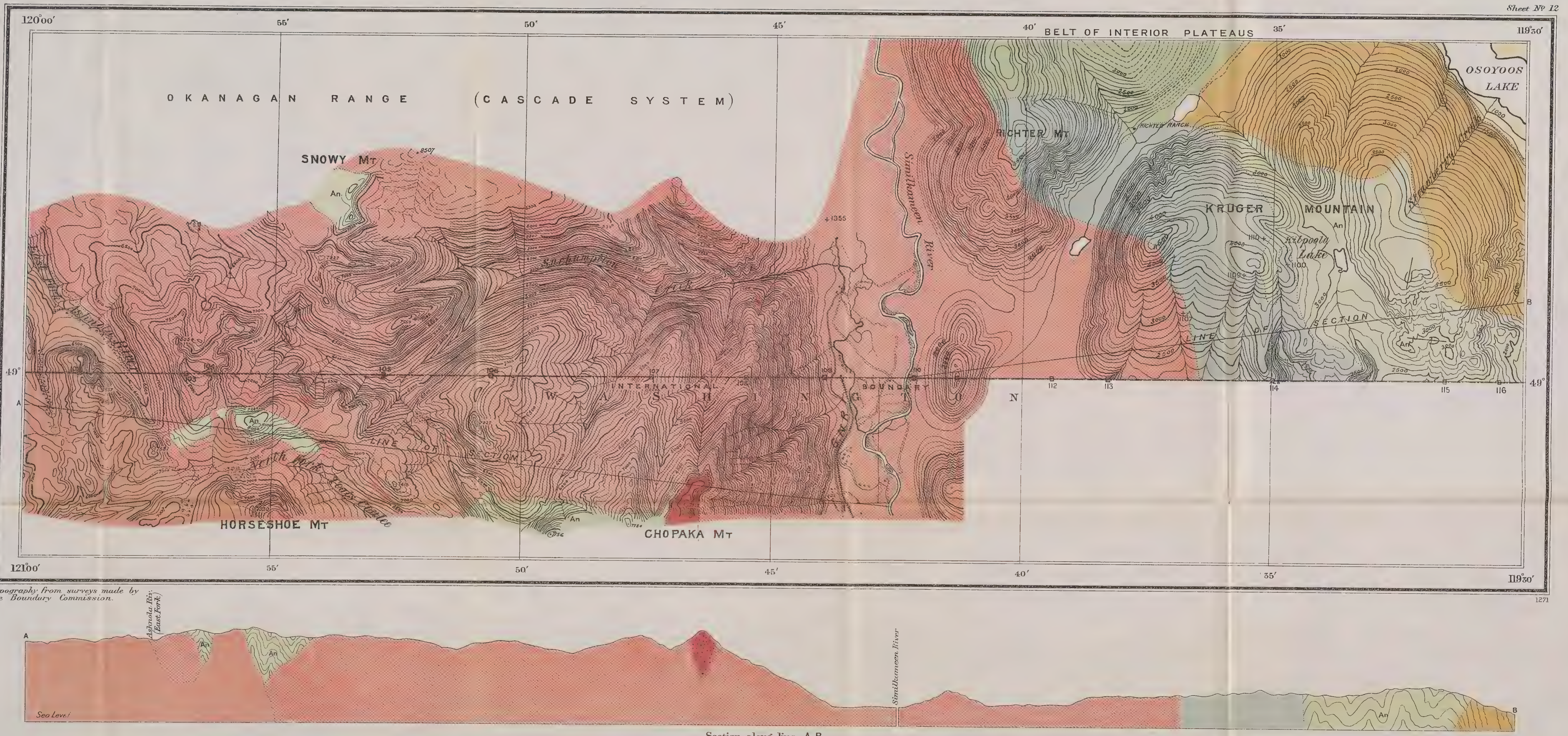
Peridotite

Symbols

Geological boundary

Glacial striae

Note. Structure of Anarchist series, shown in section, merely diagrammatic.
Localities of chemically analyzed rocks, shown thus. +1100



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 0.9864 Statute Miles to 1 Inch

Miles

Contour interval, 100 feet

MAP 85 A

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LEGEND

PLEISTOCENE(?)

Vesicular dikes of basalt *(Bauerman Ridge)* and andesite *(cutting Basic Complex)*

TERTIARY

Park granite stocks

Cathedral batholith
younger hornblende phase

Cathedral batholith
older phase; alkaline biotite granite

LOWER CRETACEOUS

Agglomerate

JURASSIC(?)

Remmel batholith
Eastern phase; highly salic derivative of sheared granodiorite

Remmel batholith
Western phase; sheared granodiorite

LATE PALAEOZOIC(?)

Ashnola gabbro

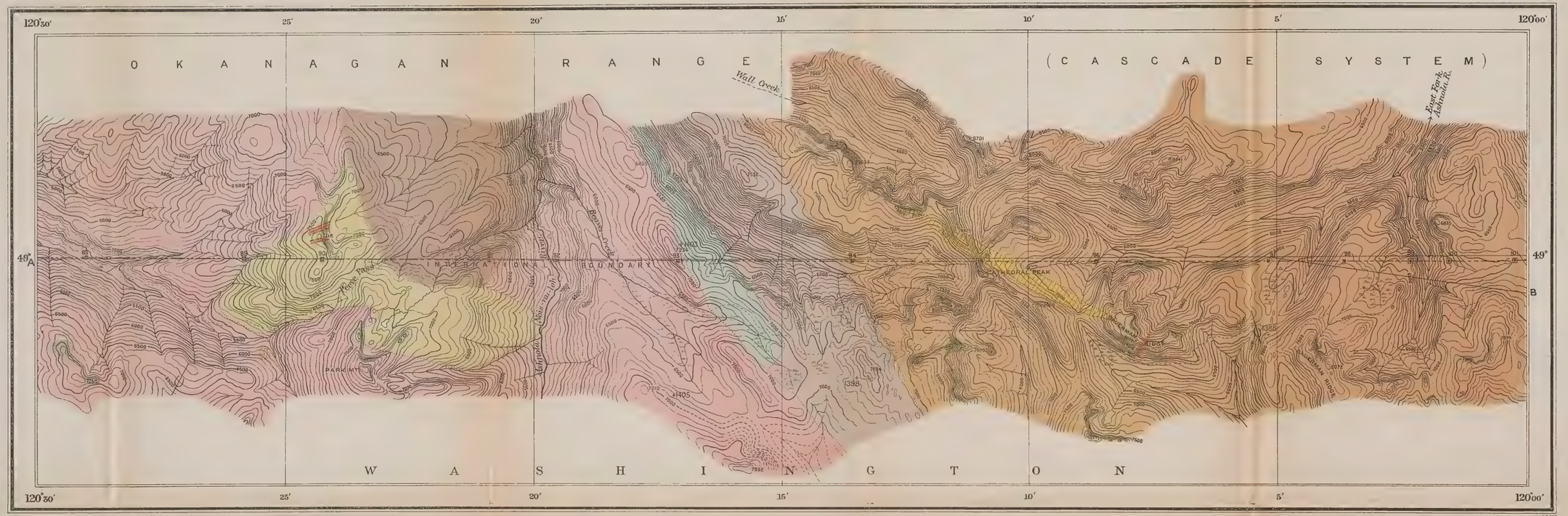
Basic complex

Symbols

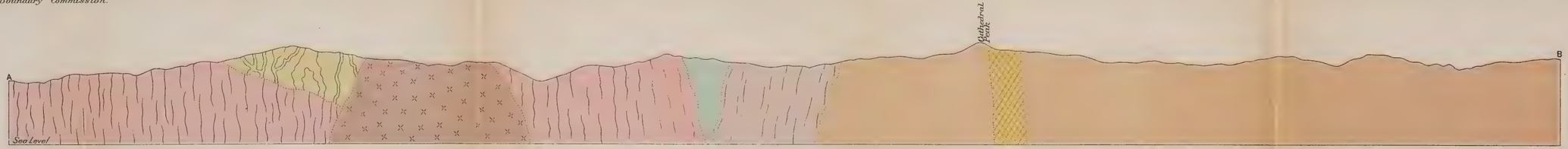
Geological boundary

Glacial striae

Note. *Localities of chemically analyzed rocks shown thus,* +1388



Topography from surveys made by the Boundary Commission.



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale; $\frac{1}{62500}$ = 09864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 86 A

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SHEET 14—HOZOMEEN RANGE

LEGEND

CRETACEOUS (CRETACEOUS AND JURASSIC?) — Pasayten series

- L — Member L: *black argillite*
- K — Member K: *green and grey sandstone with interbeds of shale and conglomerate*
- J — Member J: *coarse conglomerate*
- B-1 — Members B to I: *arkose and sandstone chiefly with conglomerate and shale*

CARBONIFEROUS OR DEVONIAN — LOWER PALEOZOIC

- Py — Pasayten volcanic formation: *andesite breccia*
- Hz — Hozomeen series: *greenstone, cherty quartzite & limestone pods*

MIOCENE (?) — Intrusive

- Syenite porphyry: *chonolith*
- Castle Mountain stock: *granodiorite*
- Lightning Creek stocks: *diorite*

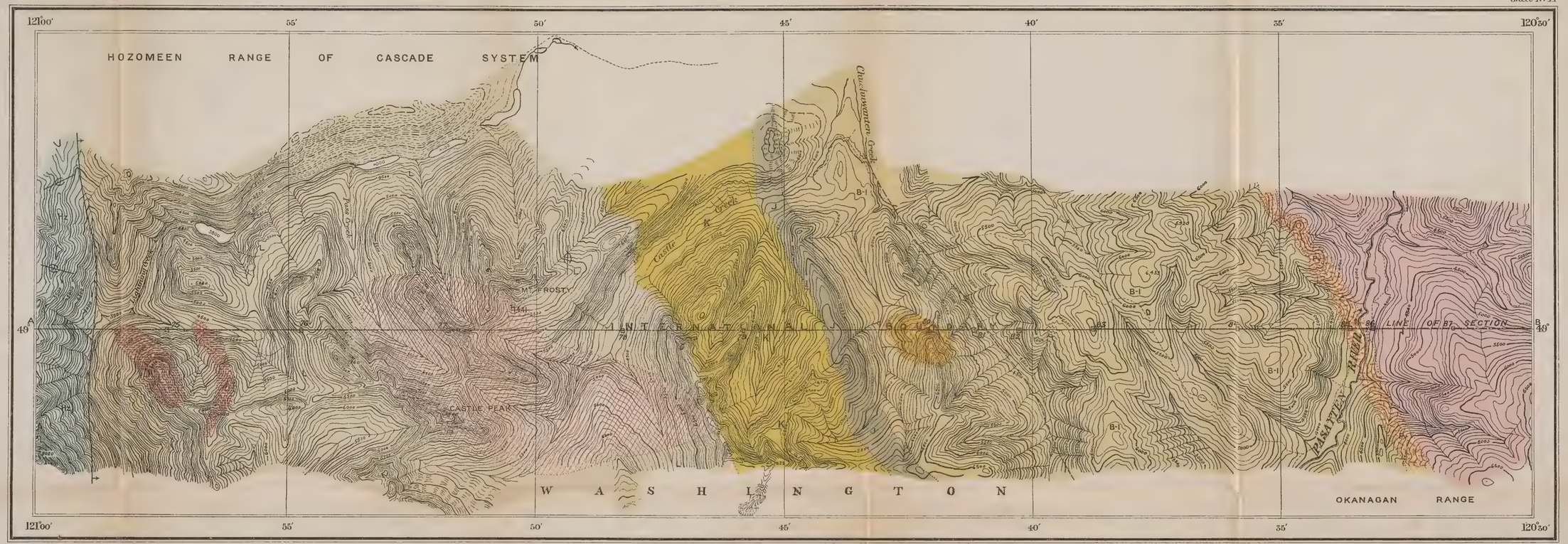
JURASSIC(?)

- Remmel batholith: *western phase; sheared granodiorite*

Symbols

- Geological boundary
- Fault
- Glacial striae

Note. *Structure of Hozomeen series shown in section, merely diagrammatic.*
Localities of chemically analyzed rocks shown thus, +1441



Topography from surveys made by the Boundary Commission.

1273

Section along line AB

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R.A. Daly.

Scale: $\frac{1}{62500}$ — 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 87A

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SHEET 15. SKAGIT RANGE

ERRATUM

Boundary Monument 59 is 1.02 miles west of Mon. 60

LEGEND

PLEISTOCENE & RECENT
- Glacial drift and alluvium

OLIGOCENE(?)
- Skagit volcanic formation
  liparite tuff
- Skagit volcanic formation
  andesite flows and pyroclastic deposits

(?) CARBONIFEROUS CARBONIFEROUS
- Ch — Chilliwack series
  locally argillite and sandstone
- Hz — Hozomeen series
  cherty quartzite, greenstone, phyllite, and limestone pods

Intrusive

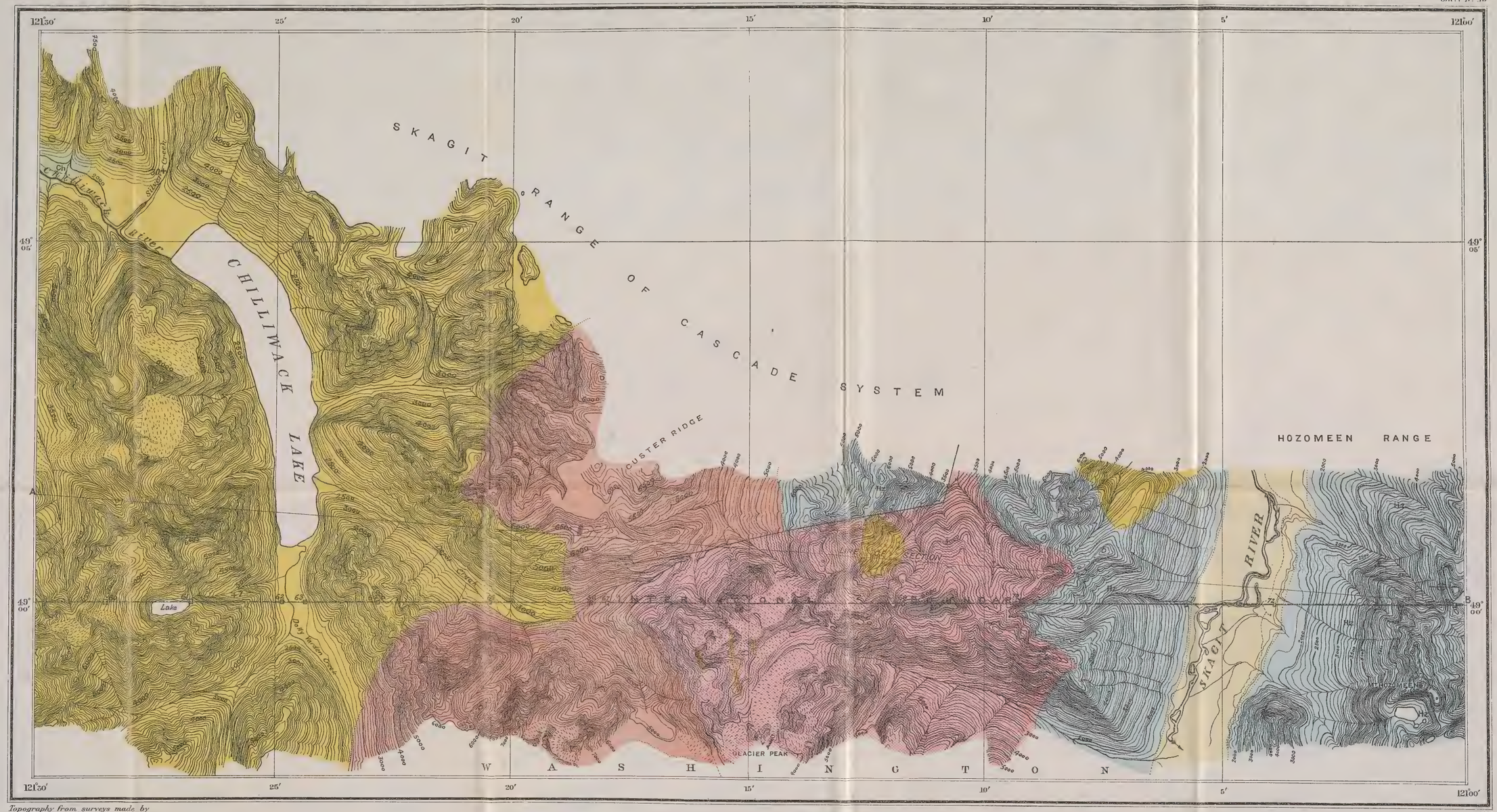
MIOCENE(?)
- Chilliwack batholith
  granodiorite
  Granite at Skagit River
- Monzonite
  stock and dikes

JURASSIC(?)
- Harzburgite
- Custer granite-gneiss
  sheared granodiorite

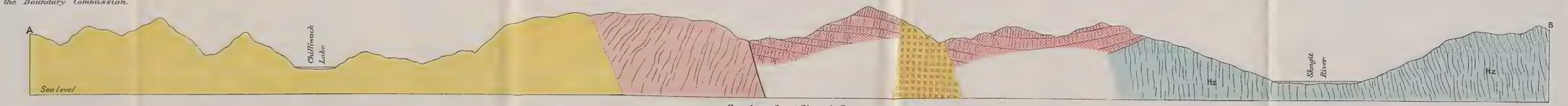
Symbols

- Geological boundary
- Fault
- Glacial striae

Note. *Structure of Hozomeen series shown on section, merely diagrammatic. Localities of chemically analyzed rocks shown thus, +1*



Topography from surveys made by the Boundary Commission.



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{62500}$ = 0·9864 Statute Miles to 1 Inch

Miles: 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 88A

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1274

SHEET 16.—CHILLIWACK RIVER

LEGEND

(?) CRETACEOUS

Ta — **Tamihy series**
conglomerate, grays and black grit stones, and grey shales

TRIASSIC

C — **Cultus formation**
dark grey to black argillite, with interbeds of grit, sandstone and conglomerate

CARBONIFEROUS

Cv — **Chilliwack volcanic formation**
chiefly flows of augite and hornblende andesites, with ash-beds

Chilliwack series
outcrops of fossiliferous limestone

CARBONIFEROUS (and older?)

Ch — **Chilliwack series**
argillite, quartzitic sandstone, and limestone, with interbeds of grit and conglomerate

Intrusive

(?) MIOCENE

3 — **Chilliwack batholith**
granodiorite, with granitic phases

CARBONIFEROUS (?)

2 — **Slesse stock**
diorite

1 — **Vedder greenstone**

Symbols

Geological boundary

Fault

Note: *Structure of Cultus formation shown in section merely diagrammatic.*

Localities of chemically analyzed rocks shown thus, + 54

SKAGIT RANGE OF CASCADE SYSTEM

122°00′ 55′ 50′ 45′ 40′ 35′ 121°30′

49° 05′

49° 00′

Alluvium

Chilliwack River

Cultus Lake

Vedder River

Sumas River

Fault

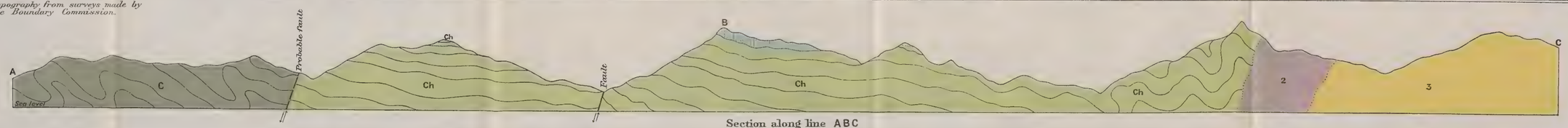
INTERNATIONAL BOUNDARY

LINE OF SECTION

WASHINGTON

Topography from surveys made by the Boundary Commission.

1275



Section along line ABC

GEOLOGY OF THE FORTY-NINTH PARALLEL. By R. A. Daly.

Scale: ~~1/2500~~ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet.

MAP 89A

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SHEET 17. SUMAS LAKE

ERRATUM

Boundary Monument 19 is 0.94 miles west of Mon. 20

LEGEND

PLEISTOCENE AND RECENT

Alluvium and glacial drift
(north of Boundary Line)

(?) EOCENE

Hu
Huntingdon formation
sandstone, conglomerate, shale and thin coal-beds

TRIASSIC

C
Cultus formation
chiefly dark-grey to black argillite, with sandstone and fine-grained conglomerate.

CARBONIFEROUS (and older?)

Ch
Chilliwack series
argillite, sandstone and fine conglomerate (here unfossiliferous)

Intrusive

Sumas batholith
granite

Sumas diorite
cut by granite (plutonic breccia)

CARBONIFEROUS (?) JURASSIC

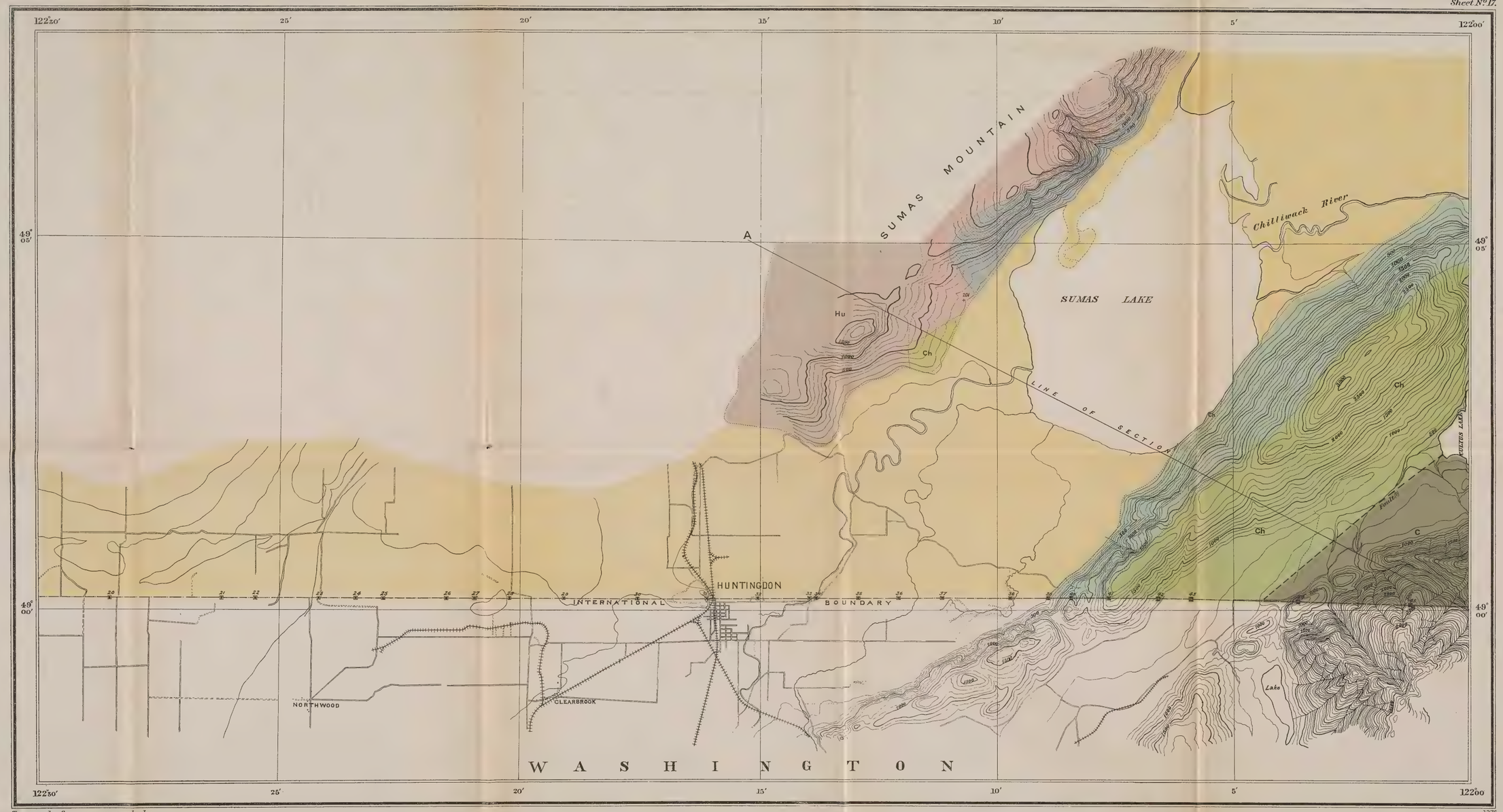
Vedder greenstone

Symbols

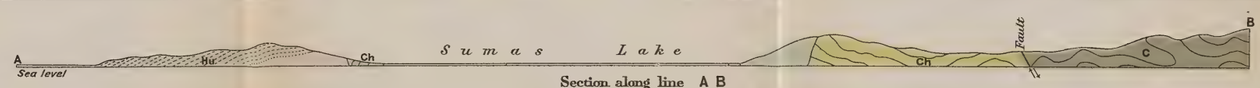
Geological boundary

Fault(?)

Note. *Localities of chemically analyzed rocks, shown thus,* +201



Topography from surveys made by the Boundary Commission.



Section along line A B

GEOLOGY OF THE FORTY-NINTH PARALLEL, By R. A. Daly.

Scale: $\frac{1}{63360}$ = 0·9864 Statute Miles to 1 Inch

Miles 1 ½ 0 1 2 3 4

Contour interval, 100 feet

MAP 90 A

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1276

PLATE 72. VIEWS IN THE ROCKY AND SELKIRK RANGES.

Typical view in the Clarke range. Looking eastward from head of Starvation Creek. The slope in middle of view is composed of the Siyeh formation capped by the Purcell Lava which is overlain by the Kinla formation.

Summit of the Nelson range (Selkirk system). Looking north from a point a half-mile south of the Dewdney trail. Beehive Mountain distant, on the left.

Nelson range, looking west from summit ridge north of Dewdney trail. Ridges of near distance composed of vertical quartzites, etc., of the Summit series.

(In pocket.)

PLATE 73. VIEWS IN THE SELKIRK, COLUMBIA AND CASCADE RANGES.

Columbia River terrace and the Pend D'Oreille mountains (Selkirk system). Looking southwest from near International Boundary.

Typical view in the Midway Mountains. Looking northeastwardly across Kettle River near bridge six miles above Midway.

Typical view in the Skagit range. Looking east from divide between Middle and Slesse creeks. Chilliwack River valley on the left. View shows accordance of summit levels.

(In pocket.)

ERRATA

Appendix 6.

Report of the Chief Astronomer 1910

Part III—maps

Sheet 17.—Boundary Monument 19 is 0.94 miles west of Mon. 20
" 15.— " " 59 is 1.02 " " " " 60
" 10.— " " 144 should be deleted
" " 145 should read 144
" " 146 " " 145
" " 147 " " 146
" " 148 " " 147
" " 149 " " 148
" " 150 " " 149
" " 151 " " 150
" " 152 " " 151
" " 153 " " 152
" " 154 " " 153
" " 155 " " 154
Sheet 9.— " " 156 " " 155
" " 157 " " 156
" " 158 " " 157
" " 159 " " 158
" " 160 " " 159
" " 161 " " 160
" " 162 " " 161
" " 163 " " 162
" " 164 " " 163
" " 165 " " 164
" " 165 is a few yards east of the railway track near Laurier.
Sheet 5.— " " 207 is 2.72 miles west of Mon. 208
" " 207 should read 208
" " 208 " " 209
" " 209 " " 210
" " 210 " " 211
" " 211 " " 212
" " 212 " " 213
" " 213 " " 214
" " 214 " " 215
" " 215 " " 216
" " 216 " " 217
" " 218 is 0.02 miles east of Mon. 217
" " 217 should read 219
" " 218 " " 220
" " 219 " " 221
" " 220 " " 222
Sheet 4.— " " 221 " " 223
" " 222 " " 224
" " 223 " " 225
" " 224 " " 226
" " 225 " " 227

Sheet 4.— Boundary Monument 226 should read 228
(continued) " " 227 " " 229
" " 228 " " 230
" " 229 " " 231
" " 230 " " 232
" " 231 " " 233
" " 232 " " 234
" " 233 " " 235
" " 234 " " 236
Sheet 3.— " " 235 " " 237
" " 236 " " 238
" " 237 " " 239
" " 238 " " 240
" " 239 " " 241
" " 240 " " 242
" " 241 " " 243
" " 244 is 0.22 miles west of Mon. 245
" " 242 should read 245
" " 243 " " 246
" " 244 " " 247
Sheet 2.— " " 245 " " 248
" " 246 " " 249
" " 247 " " 250
" " 248 " " 251
" " 252 is 1.35 miles east of Mon. 251
" " 249 should read 253
" " 250 " " 254
" " 251 " " 255
" " 252 " " 256
" " 257 is 2.59 miles east of Mon. 256
" " 253 should read 258
" " 259 is 2.14 miles east of Mon. 258
" " 254 should read 260
Sheet 1.— " " 255 " " 261
" " 256 " " 262
" " 257 " " 263
" " 258 " " 264
" " 259 " " 265
" " 260 " " 266
" " 261 " " 267
" " 262 " " 268
" " 269 is 0.94 miles west of Mon. 270
" " 263 should read 270
" " 264 " " 271
" " 265 " " 272
" " 273 is 1.16 miles east of Mon. 272